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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,585	02/23/2004	Michael Long	87181RLO	9644

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EXAMINER

MARKHAM, WESLEY D

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/784,585	Applicant(s) LONG ET AL.	
	Examiner Wesley D. Markham	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2005 and 06 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 17-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the amendments filed by the applicant on 4/11/2005 and 7/6/2005, in which three(3) replacement sheets of drawings were submitted and Claims 1 – 3, 6 – 12, 15, and 16 were amended. **Claims 1 – 25** remain pending in U.S. Application Serial No. 10/784,585, and an Office action on the merits follows.

Election/Restrictions

2. This application contains Claims 17 – 25 drawn to an invention nonelected with traverse in the reply filed on 1/11/2005. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Drawings

3. The three (3) sheets of formal drawings filed on 4/11/2005 are acknowledged and approved by the examiner.

Claim Observations

4. Please note that the 35 U.S.C. 102 and 103 rejections based on Grant et al., Tsunashima et al., Xu et al., and GB 1,253,124 (Davies et al.) set forth in the previous Office action (i.e., the non-final Office action mailed on 2/10/2005) are withdrawn in light of the applicant's amendments and associated remarks.

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Specifically, the claims have been amended to require performing the claimed process with a solid organic material instead of an organic material in general. The processes of Grant et al., Tsunashima et al., Xu et al., and GB 1,253,124 all relate to the vaporization of liquid organic materials and therefore do not teach or reasonably suggest the presently claimed process.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each

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claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1 – 7 and 9 – 15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kamiyama et al. (USPN 6,340,501).
9. Regarding **Claims 1 – 7 and 9 – 15**, Kamiyama et al. teaches the claimed method for vaporizing solid organic materials onto a substrate surface to form a film (Abstract, Figures 8, 9, 12, 13, and 17, Col.7, line 59 – Col.8, line 27 (for the specific solid organic materials used); Col.8, lines 28 – 56, Col.13, line 51 – Col.16, line 25, and Col.21, lines 1 – 28 (for the claimed first heating region, second heating region, metering, and vaporization steps); and Col.18, lines 24 – 53 (for the claimed vaporization interruption step)). Please note that Kamiyama et al. teaches that the process is carried out with a mixture of a plurality of solid organic materials (Col.8, lines 18 – 27), as required by independent Claim 10. Kamiyama et al. also teaches that the solid organic material is metered through the orifice of a hopper / reservoir / supplying device (i.e., a “permeable member”, due to its ability to dispense the solid material through a hole therein) into the heating regions at a controlled rate that varies linearly with vaporization rate (Figures 8 – 13, Col.13, line 51 – Col.16, line 25), as recited in Claims 2 and 11. The step of providing a residence time at elevated temperature (Claims 4 and 13) is taught by Kamiyama et al. at Col.15, lines

47 – 67). The cups “228” of Kamiyama et al. have a constant volume throughout the process, including in the second heating region, as required by Claims 5 and 14.

Regarding Claims 6, 7, and 15, each of the heater blocks “282”, “284” and “230” of Kamiyama et al. heat the material to “a predetermined (high or higher) temperature” (Col.15, lines 47 – 67), which meets the “constant heater temperature” in the first and second heating region limitations. Alternatively, it would have been obvious to one of ordinary skill in the art to utilize a constant heater temperature in each of the heating regions because doing so would achieve the objective of Kamiyama et al. (i.e., heating to a predetermined temperature in each stage of a series of heating stages) as simply as possible. Regarding Claim 9, Kamiyama et al. teaches metering the solid organic material into the heating zones using a rotating cylindrical member “232” (see Figures 9 – 13), which has reasonably been interpreted to be a “rotatable drum”. Regarding independent Claims 1 and 10, Kamiyama et al. also teaches maintaining the solid organic material at below the vaporization temperature in a first heating region and above the vaporization temperature in a second heating region (see, for example, Figures 8 and 12, which clearly depict the solid material being vaporized only when it reaches the second heating region (i.e., over heaters “206” and “230”). Alternatively, it is clearly the intention of Kamiyama et al. to only vaporize the solid organic material once it has reached a position below the substrate(s) to be coated (i.e., in the “second heating region”) and to pre-heat the material gradually and moderately (Figures 8 and 12; Col.15, lines 47 – 67).

Therefore, it would have been obvious to one of ordinary skill in the art to maintain

the first heating region(s) below the vaporization temperature and the second heating region above the vaporization temperature so that the material is not prematurely vaporized and wasted before it reaches a position underneath the substrate(s) to be coated (i.e., the second heating region).

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama et al. in view of Peng (USPN 6,467,427).

11. Alternatively to the reasoning presented above, Kamiyama et al. teaches all the limitations of **Claim 9** as set forth above in paragraph 9, except for a method wherein the solid organic material is metered on the surface of a rotatable drum. However, Peng teaches that supplying a solid evaporation source material into a crucible by using a rotating cylindrical wheel (i.e., a "rotatable drum") has the advantages of (1) providing a continuous supply of evaporation source material so that the evaporation chamber can perform vapor deposition for a long period, (2) providing a fixed quantity of source material at a fixed interval of time, and (3) never having to stop to reload the source material, thereby increasing productivity (Figures 2B and 2C; Col.3, line 1 – Col.4, line 4). Therefore, it would have been obvious to one of ordinary skill in the art to supply the solid organic material of Kamiyama et al. on a rotating drum as taught by Peng et al. in order to reap the benefits discussed above.

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12. Claims 1, 3 – 7, 10, and 12 – 15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yamazaki et al. (US 2002/0132047 A1).

13. Regarding **Claims 1, 3 – 7, 10, and 12 – 15**, Yamazaki et al. teaches the claimed method for vaporizing solid organic materials onto a substrate surface to form a film (Figures 1, 2, 4, 5, and 7; paragraphs [0019] – [0027], [0043] – [0060], [0086] – [0104], [0125] – [0128], [0144], [0145], and [0160]). In the process of Yamazaki et al., any or all of the heating / melting / cooling zones through which the solid organic material is moved through in order to purify the organic compound prior to sublimation / evaporation is/are considered to be the “first heating region”, and the heating zone which finally heats the purified solid organic material to a temperature sufficient to vaporize the solid organic material and supply the vaporized material into the film forming chamber is the “second heating region”. Please note that a plurality of organic compounds are provided in a single vaporization source (paragraphs [0144], [0145], and [0160]), as required by independent Claim 10. Additionally, the temperature of the first heating region(s) is only sufficient to melt the solid organic material (see Figures 7A and 7B, for example) and therefore is below the vaporization temperature, as required by independent Claims 1 and 10. Alternatively, the goal of preheating the solid organic material of Yamazaki et al. is to melt the solid organic material prior to vaporizing it in order to purify the material (paragraphs [0019] – [0027]). Therefore, it would have been obvious to one of ordinary skill in the art to heat the solid organic material to a temperature sufficient to

melt the material but not vaporize it in the first heating region(s) so that the goal of Yamazaki et al. is achieved without wasting the organic source material prior to the deposition process (e.g., due to undesired premature vaporization).

14. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. in view of TDK (EP 0 982 411 A2) and Grant et al. (US 2003/0116091 A1).
15. Yamazaki et al. teaches all the limitations of **Claims 8 and 16** as set forth above in paragraph 13, except for the claimed cooling base block surrounding the solid organic material in the first heating region (i.e., the region in which the solid organic material of Yamazaki et al. is melted). However, TDK teaches that a crucible used to house a solid organic source material in a vapor deposition process includes both a heater and a cooling mechanism (i.e., a cooling jacket) tightly surrounding the crucible so that the thermal response rate can be increased (paragraphs [0041] – [0043]), and Grant et al. teaches that a liquid cooling jacket in which liquid is circulated through the jacket is effective in cooling a vaporization source material (paragraph [0011]). Therefore, it would have been obvious to one of ordinary skill in the art to surround the crucible (and therefore, the solid organic material) of Yamazaki et al. with a cooling base block (e.g., a liquid cooling jacket) in addition to the heating mechanism surrounding the crucible so that the thermal response rate (i.e., the temperature control of the crucible) is improved. This fast and accurate temperature control would clearly be beneficial in a process such as that of

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Yamazaki et al. in which the crucible / organic material is alternately heated and cooled in order to repeatedly melt and solidify the organic material prior to vaporization.

Response to Arguments

16. Applicant's arguments filed on 4/11/2005 have been fully considered but they are not persuasive. Specifically, the applicant's arguments are moot in view of the new grounds of rejection set forth above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tsubaki et al. (USPN 6,696,096) teaches vacuum vapor depositing a solid organic material to form an OLED in an apparatus in which a hot wall encloses the vapor sources. Kim et al. (US 2004/0016400 A1) teaches vacuum vapor depositing a solid organic material to form an OLED in an apparatus in which the vaporization source and/or the vaporization source heater is movable. Yamamoto et al. (USPN 6,179,923) teaches pre-heating a source material in one chamber and then transferring the source material to another chamber in order to vapor deposit a solid organic material in the production of an OLED. Yang et al. (US 2005/0072361 A1) teaches a vapor deposition method in which only the top portion of a source material-containing crucible is heated to evaporate the material. Harris et al. (USPN 5,041,719) teaches a two-zone electrical furnace used to heat and evaporate a solid source

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material in a MBE deposition process. Jang et al. (US 2005/0047979 A1) teaches an apparatus and process for vacuum sublimating a material used to form an OLED.

Rachor et al. (USPN 4,470,370) teaches using a rotating drum to load a solid source material into a crucible to be evaporated in a vapor coating process.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D. Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



WDM

Wesley D Markham
Examiner
Art Unit 1762



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER